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PROBLEMS FOR SOLUTION.

ARITHMETIC.

146. **Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy, Defiance College, Defiance. O.**

If the driving-wheels of Locomotive No. 200 on the Pennsylvania Railroad, $m=7$ feet in diameter, turn $n=20$ times in $p=3$ seconds, and lose $r=12\%$ of their forward motion by slipping on the smooth steel rails, at what rate per hour is the locomotive moving over the rails?

147. **Proposed by F. P. MATZ. M. Sc., Ph. D., Professor of Mathematics and Astronomy in Defiance College, Defianca, O.**

Stock bought $m=10\%$ above par pays $p=8\%$ on the investment. What per cent. will it pay if bought at $n=10\%$ discount?

⁂ Solutions of these problems should be sent to B. F. Finkel not later than Nov 10.

ALGEBRA.

142. **Proposed by A. H. BELL, Hillsboro, Ill.**

If x/y is the convergent preceding the complete quotient $(\sqrt{A}+m)/n$; prove that $x^2-Ay^2=\pm n$.

143. **Proposed by JOHN M. COLAW, A. M., Monterey, Va.**

Solve $x+y+z+u=a\ldots.(1)$.

$x^2+y^2+z^2+u^2=b\ldots.(2)$.

$x^3+y^3+z^3+u^3=c\ldots.(3)$.

$x^4+y^4+z^4+u^4=d\ldots.(4)$.

144. **Proposed by F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Defiance College, Defiance, O.**

Show that the number of ways in which 15 different problems may be distributed among 5 students so that each student shall have three of them, is $N=(5.3)!/(3!)$.

⁂ Solutions of these problems should be sent to J. M. Colaw not later than Nov. 10.

GEOMETRY.

172. **Proposed by W. J. GREENSTREET, M. A., Editor of The Mathematical Gazette. Stroud, Gloucestershire, England.**

The center N of the 9-point circle of a triangle ABC lies on P, the pedal line of a point on the circumcircle. Find the angle of intersection of P and AB.

173. **Proposed by P. C. CULLEN, Principal of Schools, Indianola, Neb.**

To construct circle tangent to a given line at a given point such that tangents drawn to this circle and passing through two fixed points shall be parallel.

174. **Proposed by J. M. HOWIE, Professor of Mathematics, The Nebraska State Normal School, Peru, Neb.**

Describe a circle which shall pass through a given point and be tangent to two given circles.

⁂ Solutions of these problems should be sent to B. F. Finkel not later than Nov. 10.

CALCULUS.

135. **Proposed by COOPER D. SCHMITT, M. A., Professor of Mathematics, University of Tennessee, Knoxville, Tenn.**

To find the equation of the evolute of the common catenary

$$y=(\tfrac{1}{2}c)(e^{c/x}+e^{-c/x}).$$

136. **Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics, The Temple College, Philadelphia, Pa.**

Evaluate the definite integral

$$\int_0^1\int_0^1\frac{v^{l-1}u^{m-1}(1-v^n)^{p-1}(1-u^s)^{r-1}dvdu}{[bv^n+c(1-v^n)]^{p+l/n}(u^s+a)^{r+m/s}}.$$

137. **Proposed by F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Defiance College, Defiance, Ohio.**

Develop the equation of the curve assumed by the inextensible and revolving skipping rope.

⁂ Solutions of these problems should be sent to J. M. Colaw not later than Nov. 10.

MECHANICS.

124. **Proposed by F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Defiance College, Defiance, Ohio.**

A pendulum-bob, weight$=w$, is suspended by a perfectly elastic cord, length l. This pendulum makes n vibrations *up and down*, through a space of $2m$ inches while it makes a complete vibration in an arc of 2ψ. Determine the nature of the curve described by the center of the pendulum-bob in making one complete vibration in arc.

125. **Proposed by THOMAS U. TAYLOR, C. E., Professor of Civil Engineering, University of Texas, Austin, Texas.**

(1) If a parabola is described on the verticle face of a reservoir wall, axis vertical and in the surface, and $P\,(h,\,b)$ be any point on the curve, and B the foot of the perpendicular from P on the axis, find c. p. on area OBP.

(2) If A is point where horizontal through P cuts vertical axis (OY), find c. p. on area OAP.

⁂ Solutions of these problem should be sent to B. F. Finkel not later than Nov. 10.

DIOPHANTINE ANALYSIS.

89. **Proposed by JOSIAH H. DRUMMOND, LL. D., Portland, Me.**

Show that in $2x^2+2y^2-z^2=\square\ \ldots.(1)$,

$$2x^2+2z^2-y^2=\square\ \ldots.(2),$$

$$2y^2+2z^2-x^2=\square\ \ldots.(3),$$

any two numbers and their sum and difference will satisfy the conditions.